

DRINKING WATER: BOIL-WATER ORDERS MANUAL

**Field Services Division
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**Missouri
Department of
Natural Resources**

DRINKING WATER – BOIL WATER ORDERS MANUAL

640.130 Statutory Authority

Authority

Section 640.130 of the Missouri Safe Drinking Water Law states, “Whenever the Department of Natural Resources determines that an emergency exists which endangers or could be expected to endanger the public health and safety with regard to drinking water supplies, the Department of Natural Resources may, without notice or hearing, issue an [administrative] order reciting the existence of such a condition and requiring the person to take such action as will lessen or abate the danger.” This statement provides the necessary authority for issuing boil water orders.

Boil water orders are special type of written administrative order. They are an enforcement tool used to require system officials to issue a public notice to affected customers advising them to boil their drinking water.

Generally, the authority to issue administrative orders rests with the department director. However, to protect the public, boil water notices must be issued quickly. In response, a succession of department directors has delegated the authority to issue “Boil Water Orders” to the regional directors. The authority to issue boil water orders is delegated for generally the following circumstances:

- A system violates the acute maximum contaminant level for fecal or *Escherichia coli*form;
- Chlorine residuals less than 0.2 mg/l in the distribution system;
- Water pressures less than 20 psi occur anywhere in the distribution system;
- Finished water turbidities greater than 1.0 NTU occur in any confirmed test in surface water systems.

Definitions

Boil Water Order

A boil water order is a written administrative order issued by the department ordering system officials to issue a public notice to their water customers recommending that they boil their drinking and cooking water. It is a special type of emergency administrative order.

Boil Water Notice

A boil water notice is a public notice issued by the officials of a public water system to the customers of that public water system recommending that they boil their drinking water. A boil water notice may be issued as a result of receiving a boil water order or it may be issued voluntarily at the discretion of the public water system officials.

Implementation

When conditions exist in a drinking water system that endanger or could be expected to endanger the public health and safety, it is imperative that the people affected are notified of these conditions and are given the opportunity to protect themselves and their families. The regional offices are responsible for assuring that the affected consumers are notified of such conditions. Boil water orders are one of several methods of assuring that consumers are notified. However, it is department policy to encourage systems to take the correct action without resorting to enforcement and issuing a boil water order is an enforcement action. Public water systems not only have the right but have the responsibility to issue notices to the public they serve and may do so without first getting department approval. Before issuing a boil water order, regional staff must decide whether the officials of the public water system will and can adequately issue the public notice voluntarily. If they will and can, a boil water order may not be appropriate.

Most conditions under which regions are allowed to issue boil water order are violations of the public drinking water regulations that require Tier 1 public notice as described by the Missouri Public Drinking Water Regulation 10 CSR 60-8.010. When a violation occurs, the region must issue a Notice of Violation and the appropriate Public Notice and Public Notice Procedure/Certification forms to the system whether or not a boil water order is issued. A boil water order is not a substitute for a Notice of Violation but is an additional tool to assure that affected consumers are quickly notified. The regulations clearly make the systems responsible for issuing public notices and make the failure to issue a public notice an additional violation of the regulations. A boil water order is not a substitute for the Tier 1 public notice and the water system is still responsible for fulfilling all of the regulatory requirements for a Tier 1 public notice. However, if a boil water order is not issued, any voluntary boil water notice issued by the system should be reported on the Public Notice Procedure/Certification forms as well as the required Tier 1 notice.

For some public water systems, issuing a boil water notice may not be the appropriate action to protect the public. In both transient and non-transient non-community water systems, the people using the water generally do not have the means available to boil their water. In these systems the public can be better protected by shutting down the problem system, shutting off drinking fountains, posting “do not drink the water” signs in restrooms, at all potable water taps and at fountains, or providing bottled water. If an administrative order is required, it will not be a standard boil water order but should state the specific actions required to protect the public.

Under emergency conditions as described above and below (under APPLICATIONS), the staff of each regional office may issue a boil water order at the discretion of the regional director. To do so, the regional director (or designee) notifies the Boil Order Notification e-mail group which includes staff from the Public Drinking Water Branch (PDWB), Field Services Division, Division of Environmental Quality, and Director’s Office, using e-mail (High-Priority) to outline the details and facts of the situation, and issues a boil water order to the public water system. The regional director (or designee) should follow up the e-mail with a brief telephone call to PDWB to insure the information is received promptly. The boil water order is a written order that must be issued and sent by certified mail and should be issued to the chief executive of the water system. For cities the chief executive is the mayor; for water districts and home owners associations it is the president of the board; for transient non-community systems it is the owner or manager of the system, and so forth. In some cases, the regional director may determine that the department should assist a water system and issue the news media notices (radio/television). The regulations 10 CSR 60-8.010(10) authorize the department to give a public notice on behalf of a water system but still makes the system officials responsible for meeting the requirements of the rule. Therefore, we can not absolve the system from the responsibility of issuing a public notice. Most boil water notices are required because of regulation violations that require Tier 1 public notification. Even if a boil water order is issued, the water systems are responsible for issuing Tier 1 public notification, which may include posting or hand delivery of notices as well as media notices.

If it is the judgment of the regional director that the public water system is unwilling or is unable to issue the appropriate notice, the regional director should issue a boil water order and a news release to the electronic news media serving the affected system that a boil water order has been issued. For small systems that are not adequately served by electronic news media, the regional director may decide to have copies of the news release hand delivered to each customer of the affected water system. If it is decided that enforcement action is not required to get a system to issue a boil water notice, a boil water order should not be issued and media notice is not the region’s responsibility. Below (Appendices A, C & E) are the forms to be filled in and used when contacting the media representatives. The boil order form gives basic information on the location and cause of the boil order, as well as precautions to be followed by the public served by the affected water system.

The form (Appendices B, D & F) for a boil order rescission (lift) gives the location of the affected water system and the effective date for the lift. A contact name and phone number should be filled in at the bottom so media may call for more information.

The person(s) from the regional office assigned to notify the media should fax a copy of the completed form to all the area newspapers and television and radio stations. However, most television stations will be interested only when the boil order affects a significant number of people. When no fax number is available, someone from the regional office should read the information over the phone to a representative at the newspaper, or radio or television station. Any request from the media for more information should be referred to the contact person listed at the bottom of the form. A list of the media representatives contacted and the media they represent should be made. The regional office should contact the same media representatives when the boil order is rescinded as when the order was issued.

APPLICATION

1. Microbiological Contamination

- a) The presence of fecal contamination in a public water system as indicated by acute maximum contaminant level violation is sufficient cause for issuing a boil water order and a notice to consumers to boil all water used for drinking or culinary purposes. An on-site investigation must be made to determine the cause of the positive samples and to assure that the samples are a valid representation of water quality before issuing a boil water order. The boil water order and its corresponding public notice must remain in effect until analyses indicate the water is safe to use and the problem has been corrected to the satisfaction of the regional director.

Once an investigation confirms that the water is contaminated, systems that do not disinfect must be required to disinfect their wells and distribution system. Sufficient chlorine must be added to provide at least 0.5 mg/l of free chlorine throughout the distribution system. The boil water order cannot be rescinded until system is flushed to remove all water with a chlorine residual. After flushing, the public water system must collect three bacteriological samples each day for two consecutive days from routine sample sites. One of these samples shall be from a site with an *Escherichia* coliform positive result that caused the violation and the other samples shall be from sites scattered throughout the distribution system. The consecutive day samples must all test absent for total and *Escherichia* coliform bacteria or the disinfection/flushing procedures and consecutive day sampling must be repeated. Non-community systems may collect more than one sample from a tap if sufficient sample taps are not available.

For systems that continuously disinfect the disinfectant residuals will not be flushed from the system and the same procedures cannot be used as for systems that do not disinfect. If free chlorine is used as the distribution disinfectant residual, chlorine residuals must be increased and the system flushed until at least a 0.5 mg/l residual is obtained throughout the distribution system. At least one set of three microbiological samples, which are all absent of coliform bacteria must be received before lifting the boil water order and notice. If a system has a history of positive samples or poor operation of the disinfection process at least two consecutive days of samples should be collected.

If chloramines are used as the distribution disinfectant residual, the issues are more complex and the actions taken depend upon the findings of the investigation as to the cause of the positive samples. If nitrification is occurring in the distribution system, flushing alone may not be adequate to correct the problem. Instead, it may be necessary to convert to free chlorine residuals for several days to correct

the problem. Missouri regulations 10 CSR 60-4.055(3)(B) authorize the department at its discretion to require any system to provide breakpoint chlorination. If conversion is made to free chlorine residuals, the boil water order and notice can be lifted once a minimum of a 0.5 mg/l free residual is obtained throughout the distribution system and one set of three microbiological samples, which are all absent of coliform bacteria is received. If it is determined that conversion to free chlorine is not feasible, the system must be flushed and chloramine residuals increased until a minimum of a 1.0 mg/l chloramine residual is obtained throughout the distribution system. Samples should be collected and analyses done for heterotrophic plate counts as well as coliform bacteria. The boil water order and notice can be lifted once the system has been flushed and test results show that the water is safe to drink.

2. Turbidity

Turbidity in finished water above the acute maximum contaminant level indicates that the treatment process has broken down and cryptosporidium or giardia may be present in the drinking water. Turbidity measurements in excess of the acute maximum contaminant level (1 turbidity units in more than 1 confirmed measurement) are sufficient cause to issue a boil water order. The boil water order must remain in effect until turbidities leaving the treatment plant and throughout the system are reduced to 0.3 turbidity units or less, and the problem has been corrected to the satisfaction of the regional director. If the surface water system wholesales water to other public water systems all secondary systems served must be included in any boil water order and notice. Before issuing a boil water order an investigation must be done to determine if the samples are truly representative of the water quality dispensed to the public. High turbidity readings have occurred because of malfunctioning equipment and other conditions that do not involve the treatment process breaking down and the presence of cryptosporidium or giardia in the drinking water.

Cryptosporidium and giardia are highly resistant to disinfection and their presence is not indicated by coliform bacteria so adequate disinfectant levels and negative coliform bacteria sample results are not proof that the water is safe to drink. When the acute turbidity level is exceeded, first control of the treatment process must be regained then the entire distribution system must be unidirectionally and systematically flushed to remove contaminated water and hopefully harmful organisms. Certainly a system must be able to maintain adequate disinfectant levels throughout its distribution system and have safe bacteria samples. Still, the boil water order can be rescinded only after turbidities leaving the treatment plant and throughout the system are reduced to 0.3 NTU or less.

Before flushing the water distribution system, the system operators must show that they have the treatment facilities under control and can consistently produce water that meets the 0.3 NTU maximum contaminant level and that will not exceed the acute maximum contaminant level again. Then the entire water distribution system must be flushed and samples collected and tested to assure that turbidities throughout the system are less than 0.3 NTU. If the system uses chloramines for disinfection, a minimum of 1.0 mg/l chloramine residual must be obtained throughout the distribution system. If the system uses free chlorine for disinfection, a minimum of 0.5 mg/l free residual must be obtained throughout the distribution system. After flushing and testing at least five samples should be collected and analyzed for total coliform bacteria. If the samples test negative for coliform, the boil water order can be rescinded. The same process must be followed for any secondary system served.

3. Low Water Pressure

The Missouri Public Drinking Water Regulation 10 CSR 60-4.080(9) states that "Public water systems must maintain a minimum positive pressure of 20 psi throughout the distribution system under all

normal operating conditions.” Water pressures less than 20 psi can allow contamination to enter the water system through cross-connections and leaks. The largest concern is that plumbing inside buildings will be contaminated rather than the water distribution mains. Consequently, the 20 psi protective pressure was selected to protect a two story building from contamination. However, enough contamination occurrences have been documented to prove that when system pressures are less than 20 psi distribution mains are very vulnerable to contamination. Because low pressures are a complex and controversial subject, how the different regions handle low pressure occurrences differs widely. This procedure is an attempt to obtain consistency.

What are normal operating conditions? The question can best be answered with an example. Systems designed to provide fire protection must be able to provide fire flows without reducing pressures below 20 psi. So fires, which are generally considered emergencies, are actually normal operating conditions. In fact Section 320.095 of the Missouri Fire Protection law states “under no circumstance shall any (fire protection) entity be authorized to deplete a water supply to a pressure less than the minimum pounds per square inch as required by law or regulation.” By the same reasoning, we conclude that water main leaks and repairs are normal operating conditions because of their frequent occurrence. Because they are common to all water distribution systems, and because locating leaks and repairing mains are routine duties for most water systems, they are covered by the regulation.

The Missouri Public Drinking Water Regulation 10 CSR 60-7.010(2) states “within 48 hours a supplier of water must report to the department any failure to comply with any drinking water regulation.” This regulation is the legal basis for requiring water systems to report low pressure events to the department. A form, Report of Low Water Pressure, is provided in Appendix G that can be filled out and faxed to the appropriate regional office. Doing so will fulfill the system’s responsibility to report low pressure violations.

Because of their high frequency of occurrence the department has not traditionally issued Notices of Violation or boil water orders for all low pressure events. Instead staff should insist that the public water systems use approved methods for repairing, disinfecting and flushing water mains and that they report low pressure occurrences to the department. These procedures can be found in the water pollution technical bulletin, “Repair and Disinfection of Water Mains”. In addition, staff should strongly recommend systems to notify affected customers of low pressure occurrences. The intent of the boil order policy is to protect public health by assuring that affected citizens are informed of possible threats to their health or safety from the drinking water. The many telephone calls received by department offices prove that Missouri citizens expect to be notified of low pressure events. Many water systems throughout the state routinely notify customers of low pressure events and a goal of this procedure is to convince all public water systems to notify affected customers whenever low pressures occur.

Boil water orders for low pressures are issued when widespread low pressures occur that affect large areas or many customers and when water system officials refuse to issue a public notice. Because the department does not normally issue Notices of Violation for low pressures, we have accepted most good faith efforts by systems to notify affected customers and have not required strict compliance with Tier 1 public notification.

4. Low Chlorine Residuals

Boil water orders for low disinfectant residuals are appropriate only for systems that the department requires to disinfect. Chemical disinfectants are often fed for reasons other than disinfection such as hydrogen sulfide control so one must first be certain that the system is required to disinfect or purchases water from a system that is required to disinfect before considering a boil water order. Furthermore, low chlorine residuals alone are not adequate evidence that the public health and safety is or could be endangered.

Two conditions exist in which the department may require a boil water notice for low disinfectant residuals, low residuals leaving the treatment facility and low residuals in the distribution system. The regulations concerning disinfection are complex and somewhat difficult to follow. And, as a rule, it is difficult to justify issuing a boil water order to a system when the regulations do not require public notification. Therefore it is imperative that we understand the regulations before deciding to issue a boil water order.

Both conditions involve chlorine because the regulations (10 CSR 60-4.055(3)) accept only free available chlorine or chloramines as the disinfectant entering the distribution system. The regulations (10 CSR 60-4.055(3)&(4)) also define low chlorine residuals as being less than 0.2 mg/l. The DPD Method of chlorine analysis will give false positive readings of up to 0.2 mg/l and therefore is not accurate below 0.2 mg/l. When using the DPD Method of chlorine analysis a reading of less than 0.2 mg/l essentially means that no chlorine was detected.

The regulations (10 CSR 60-4.055(3)) require systems that disinfect to maintain either 0.5 mg/l free chlorine or 1.0 mg/l chloramines in the water leaving the treatment facility and if they fail to do so require them to notify the department. If a system fails to maintain the minimum required residual for a period of four (4) hours the department may require them to issue a public notice. However, only if either residual drops below 0.2 mg/l for over four hours do the regulations (10 CSR 60-4.055(3)(D)) mandate public notification. This is a violation of the regulations and requires a Notice of Violation and Tier 1 public notification. However, this does not mean that a boil water order is appropriate. To issue a boil water order the region must determine that the disinfection process has broken down and inadequately protected water delivered to the public. To make this determination other information than just low residuals is needed.

Whether a boil water order is appropriate depends on the degree of treatment provided by the system and the extent of the disinfection process. For example surface water treatment, lime softening and some iron removal plants provide disinfection early in the treatment process. Thus, these systems could have continued to meet disinfectant concentration and contact time (CT) requirements even though they failed to maintain the minimum residual entering the distribution system. Meeting the CT requirements indicates that the water was adequately disinfected so a boil water notice is not appropriate even though the regulations require a Notice of Violation and public notification. However, if the system did not meet CT requirements and had low residuals entering the distribution system a boil water order may be appropriate. Similarly, if a surface water system failed to meet the non-acute turbidity standard and had low chlorine residuals, a boil water order would be appropriate. For a groundwater system that provides only disinfection a boil water order would be appropriate if positive total coliform sample results were also received or if the system has a history of coliform violations.

Determining when to issue a boil water order for low chlorine residuals in the distribution system is even more complex. The regulations (10 CSR 60-4.055(4)) require water systems that disinfect or purchase water that is disinfected to maintain at least 0.2 mg/l of total chlorine residual in the

distribution system. However, compliance is based only on samples collected and analyzed at the same time and location as the bacteria samples. Furthermore, a system does not violate the regulation unless it fails to maintain 0.2 mg/l in more than 5 percent of the samples collected in two consecutive months. Therefore, a system can be in compliance and have no residuals in any samples for a month or months as long as they are not consecutive months. Likewise, a system can be in compliance and have no chlorine residuals in large parts of its system as long as it has chlorine residuals at the same times and locations as the bacteria samples. Furthermore the regulations do not consider low distribution residuals to be an imminent threat because only a Tier 2 public notice is required if a system violates the regulation.

Because of all of these issues, boil water orders are not issued for low chlorine in the distribution system unless other conditions exist that elevate the health threat. For example, if a system has positive total coliform samples and has low chlorine residuals a boil water order may be appropriate.

5. Other instances where a Boil Water Order might be warranted include:

- Any unfiltered surface water entering into system
- Evidence of a contaminated water storage tank (Appendix K)
- Natural disasters (floods, tornadoes, earthquakes) likely to have adverse affect on the water systems and water quality in a treatment plant or distribution system, other than a loss of pressure
- Man-made emergencies/threats/disasters
- Evidence of a possible disease outbreak where available data suggest drinking water may be the source

The regional director should utilize boil water orders whenever, in his/her judgment, a serious threat to the health of consumers exists, where boiling water will lessen or mitigate the threat and when the public water system officials will not or cannot issue an adequate boil water notice on their own.

In each of the above cases a boil water order is a temporary action implemented to mitigate damage until the true cause of the problem can be discovered and corrected. For example, if evidence is found of contamination of a water tank, the tank must be shut off from the system, drained, cleaned and inspected by a qualified tank inspector to determine the how the tank was contaminated. Once the methods of contamination are determined the tank must be repaired, disinfected by methods acceptable to the department, filled and samples collected to assure that it is safe to use before it is returned to service. The emergency plan of every system with a storage tank should include a description of the method for providing adequate water service while each tank in the system is removed from service. Similar procedures should be followed when handling the other instances.

II. Procedure to Issue and Rescind a Boil Water Order

Upon reaching a decision to issue a boil water order, the regional director (or designee) will notify the public water system officials by telephone that a boil water order is being issued effective immediately and that system officials must issue a boil water notice within 24 hours. This notice must instruct all affected customers to boil the water until further notice, provide a procedure for adequately boiling the water, explain what happened to require this notice and provide the name of a contact person and a telephone number that customers can call with questions. The public water system officials must be directed to notify the electronic news media serving the affected area if required, be given instructions to contact the local city or county health department, and be given instructions to contact priority customers as per their emergency operations plan. If it is the judgment of

the regional director that the public water system is still unwilling or is unable to issue the appropriate notice, the regional director should issue a news release to the electronic news media serving the affected system that a boil water order has been issued. The news release should identify the system and area of the system affected, explain the health threat and provide instructions for adequately boiling the water.

A. Issue Boil Water Order

1. Immediate Notification

- a) Regional office staff calls the public water system owner/operator IMMEDIATELY to notify them that they are under a boil water order and public notification is required.
 - 1) Explain what happened to require the boil water order.
 - 2) During the conversation gather possible causes of the problem and go over corrective steps that need to be taken at this time.
 - 3) The forms in Appendices A, C, and E may be faxed to the system. They list the precautions the customers must be notified to take.
 - 4) Tell the public water system (PWS) to contact affected priority customers and the local or county health department. Priority customers are hospitals, nursing homes, health clinics, schools, restaurants, cafeterias, food processing plants and other similar customers.
 - Non-community systems can shut down their water system until the problem has been corrected or post signs where consumers are mostly likely to see them notifying them not to drink the water.
 - Community systems can also hand deliver the notice via door hangers where feasible, but media notification is recommended for public water systems serving over 200 connections.
- b) Regional office staff notifies the Boil Order Notification Group, which includes staff from the Public Drinking Water Branch (PDWB), Field Services Division, Division of Environmental Quality, and Director's Office, by using e-mail - (send High-Priority) with a follow-up call to the Public Drinking Water Branch. The e-mail should include the following information as a minimum:
 - PWS name and ID#;
 - PWS location, county and nearest town;
 - reason for boil water order;
 - corrective action(s) already taken by PWS;
 - corrective action(s) recommended by regional office (RO);
 - the date of the boil water order issue;
 - the media contacts made; and
 - date of the contacts.
- c) Upon being notified by the regional office the Public Drinking Water Branch staff will notify representatives of the Department of Health and Senior Services that a boil water order has been issued and provide the above information. Department of Health and Senior Services staff may notify the appropriate district, county and local health departments.

- d) As a courtesy, regional office staff should help notify the affected county and district health departments directly by phone, fax or e-mail if they enough staff available in their region.
- e) In the event the regional office cannot perform any of the above due to phone or computer outages, etc., the PDWB will assist as needed.

2. Written Notification

When the decision has been made to issue a boil water order the regional office must issue a written boil water order to the public water system officials ordering them to notify the system customers either by the media or by hand delivery and to notify affected priority customers and the local or county health department to boil all water used for drinking or culinary purposes. The boil water order must advise them that public notification must be done within 24 hours of the date of the boil water order. These documents must outline the violation, the health risks, the procedure for adequately boiling the water, and the corrective steps the public water system must take. The following forms are to be used when issuing a boil water order.

- (a) "Boil Water Order News Release" Form (Appendices A, C and E) - can be filled in and used by the department when contacting the media representatives. The boil water order form gives basic information on the location and cause of the boil water order, as well as precautions to be followed by the public served by the affected water system. A contact name and phone number should be filled in at the bottom so media and residents of the affected public water system may call for more information. The person(s) from the regional office (or public water system) assigned to notify the media should FAX a copy of the completed form to all area newspapers and radio and television stations. When no FAX is available, someone from the regional office should read the information over the phone to a representative at the newspaper, radio, or television station. Any requests from the media for more information should be referred to the contact person listed at the bottom of the form.

Note: this form does not complete the public notice requirements as per the regulation, since the health effects are not listed.

- (b) Written boil water order with a Notice of Violation (NOV)
 - 1) A letter must be sent to the public water system that acts as the boil water order. The letter will advise them of the reason for issuing the boil water order and that public notification must be done within 24 hours of notification. The letter will outline violations and the corrective steps the public water system must take. (See examples in Appendices H, I, J and K)
 - 2) For fecal coliform, some chlorine and turbidity violations, a Notice of Violation (NOV) should be sent with a letter outlining the violation(s).

- (c) Public Notice Forms - The public water system owner or operator must provide notice as soon as practical but no later than 24 hours after the system learns of the violation or situation. The applicable public notice forms with certification should be sent to the public water system along with the above mentioned letter and NOV. If the regional office staff does not have public notice forms available, they can be made available to staff by the PDWB. In order to reach all persons served, water systems shall use, at a minimum, one or more of the following forms of delivery:
- 1) While the responsibility for media notification rests with the public water system, the regional offices need to be ready to notify area media about any boil water orders at community public water systems and for sending, preferably by fax or email, public notice forms for publication, posting and/or distribution to all systems;
 - 2) Public water system officials must initiate consultation with the department no later than 24 hours after an incident to determine any additional public notice requirements;
 - 3) Posting the notice in conspicuous locations throughout the area served by the public water system (this is acceptable only for very small systems);
 - 4) Hand delivery of the notice to persons served by the water system;
 - 5) Any other delivery method approved in writing by the department.

AFTER public notice has been made, the public water system must return a copy of the published, posted, and/or distributed version and the completed certification to the PDWB in Jefferson City.

NOTE: Media notification is a very useful tool but it is not required for non-community systems and small communities with 200 connections or less where door hangers (Appendixes N, O, P and Q) can be utilized. Door hangers with health effects language will complete the public notice requirement for a public water system.

II. Procedure to Lift Boil Water Order

General: The boil water order and its corresponding public notice must remain in effect until analyses indicate the water is safe to use and the problem has been corrected to the satisfaction of the regional director.

After this time, the regional director (or representative) will notify the public water system officials by telephone that the boil water order has been rescinded and that the public notice should be lifted. If the regional office issued a news release, a second news release should be issued to the same media contacts announcing that the boil water order has been rescinded. The public water system officials must be given specific instructions to contact their priority customers to inform them that the boil water notice is lifted.

A. Rescind Boil Water Order

The boil water order must remain in effect until sample results show that the water is safe to drink and the department has determined there is no longer a threat to the public health and safety. In order for a public water system to lift their boil water order, certain criteria must be met.

1. Rescind Boil Water Order

The department understands that not every emergency is the same nor is every public water system, but the basic expectations to lift the most common public water system boil water orders should be standard throughout the state.

- (a) Microbiological Contamination – *For systems that do not disinfect* a boil water order should remain in effect until safe sample results (three samples collected each day for two consecutive days) have been obtained and the regional director determines the problem has been satisfactorily corrected.
- (b) Microbiological Contamination – *For systems that practice continuous disinfection*, the system must be flushed until at least a 0.5 mg/l free chlorine residual is obtained throughout the distribution system and at least one set of three samples all absent of coliform bacteria received before lifting the boil water order and notice. Additional samples should be required if a system has a history of positive samples or poor operation of the disinfection process. If a system has a history of positive samples or poor operation of the disinfection the boil water order should remain in effect until safe sample results are received from three samples collected each day for at least two consecutive days of sampling.
- (c) Turbidity - The boil water order must remain in effect until turbidities leaving the treatment plant and throughout the system are reduced to 0.3 NTU or less, bacteriological samples that indicate the water is safe (at least five samples should be collected and analyzed for total coliform bacteria), and the problem has been corrected to the satisfaction of the regional director. (Appendix J) The same process must be followed for each secondary system served.
- (d) Low Pressures - Pressure must be restored throughout the distribution system, the affected area must be flushed and safe samples submitted. The boil water order should remain in effect until safe sample results (three samples collected each day for two consecutive days) have been obtained and the regional director determines the problem has been satisfactorily corrected. (Appendix I) If the system practices continuous disinfection, the system must be flushed until at least 0.5 mg/l of free chlorine residual is obtained throughout the affected area and at least one set of samples absent of coliform bacteria is received before lifting the boil water order and notice. The number of samples required depends on the size of the affected area, generally three.

2. Notification of Boil Water Order Rescinded

- (a) Regional office staff calls the public water system owner/operator to inform them that the boil water order is rescinded.
 - 1) During this conversation identify the corrective actions taken by the public water system and by the regional office staff.
 - 2) Tell public water system to contact affected priority customers and the local or county health department that the boil water order has been rescinded.
- (b) Regional office staff will notify by phone or e-mail that the boil water order has been rescinded:
 - 1) The regional office staff shall notify the Boil Order Notification to the Group, by using e-mail - (send High-Priority) with a follow-up call PDWB.
 - 2) The e-mail should include the following information as a minimum:
 - PWS name and ID#;
 - PWS location, county and nearest town;
 - Reason for boil water order lift;
 - Corrective action(s) already taken by PWS;
 - Corrective action(s) recommended by RO;

- Date of the boil water order list;
 - Media contacts made; and
 - Date of the contacts.
- c) Upon being notified by the regional office the Public Drinking Water Branch staff will notify representatives of the Department of Health and Senior Services that the boil water order has been rescinded and provide the above information. Department of Health and Senior Services staff may notify the appropriate district, county and local health departments.
 - d) As a courtesy regional office staff should help notify the affected county and district health departments directly by phone, fax or e-mail if the region has enough staff available.
3. Written Notification of Boil Water Order Rescinded
The regional office must issue a letter to the public water system officials advising them that the boil water order has been rescinded and identify the corrective actions taken by the public water system and by the regional office staff.
 - (a) The regional office should contact the same media when the boil water order is rescinded as when the order was issued. The Boil Water Order Rescinded form (Appendices B, D & F) gives the location of the affected water system and the effective date the boil water order is rescinded.

IV. Non-microbial Contamination

Staff should see the Emergency Operations Plan for further information and instruction and forms for each of these orders.

- A. Chemical contamination can be just as big a threat to the public water system as the microbiological contamination. Boil water orders are just one type of emergency administrative order. Other types include:
 1. DO NOT USE ORDER - This would include a chemical contamination event when dermal contact or inhalation toxicity could be problematic or if the contaminant is unknown. A Do Not Use Order would be appropriate if a waterborne illness outbreak occurs that appears to be caused by a chemical in the water or if a backflow or back-siphonage event is reported naming a specific chemical. Chemicals of concern could be pesticides and other synthetic organic chemicals, some volatile organic chemicals and chemicals potentially used in a terrorist attack. A Do Not Use Order may need to be modified to allow sanitary uses such as flushing toilets while advising ventilation of bathrooms and avoidance of personal contact with the water.
 2. LIMIT USE ORDER - A Limit Use Order could be used for systems that have special circumstances. An example of this is an acute nitrate MCL where consumption by infants is not allowed but bathing is not a problem, or the public water system that has provided bottled water for drinking but bathing, washing clothes or dishes and flushing toilets are allowed.

Forms

- Boil Water Order News release (Acute Coliform MCL) Appendix A
- Notice of Boil Order Rescinded (Acute Coliform MCL) Appendix B
- Boil Water Order News release (Turbidity) Appendix C
- Notice of Boil Order Rescinded (Acute Turbidity) Appendix D
- Boil Water Order News release (Low pressure) Appendix E
- Notice of Boil Order Rescinded (Low pressure) Appendix F
- Report of Low Water Pressure Appendix G
- Example Boil Water Order (Acute Coliform MCL) Appendix H
- Example Boil Water Order (Low Water Pressure) Appendix I
- Example Boil Water Order (Turbidity) Appendix J
- Example Boil Water Order (Contaminated Storage) Appendix K
- Report of Investigation and Corrective Action Appendix L
- Chlorination Guidelines Appendix M
- E.coli Hispanic Door hanger Appendix N
- E.coli Door hanger, Appendix O
- Low Pressure Door hanger, Appendix P
- High Turbidity Door hanger, Appendix Q

APPENDIX A

**BOIL WATER ORDER NEWS RELEASE
(Acute Coliform MCL)**

The Missouri Department of Natural Resources has issued a boil water order to **(PWS name)** with public water system ID# **(PWS id#)**. The system is located at **(PWS location)** in **(county)** County, **(in or near)**, Missouri. The order was issued because *Escherichia coliform* bacteria were found in some of the water samples taken from the public water system on **(dates of positive samples)**. *Escherichia coliform* bacteria come from the intestines of warm blooded animals and are an indicator that the water has been contaminated by fecal material. The boil water order is effective immediately and will remain in effect until corrective action has been taken and water sample results indicate that the contamination is no longer present. Public water system personnel will continue to sample the water until they determine that it is safe to drink.

Anyone served by the affected public water system should observe the following precautions:

- ◆ Boil water vigorously for three minutes prior to use for cooking or drinking.
- ◆ Disinfect food contact surfaces (dishes) by immersing them for at least one minute in clean tap water that contains one teaspoon of unscented household bleach per gallon of water.
- ◆ Dispose of ice cubes and remake with water that has been boiled.
- ◆ Continue boiling all water that is to be used for cooking or drinking until the cause of the contamination has been found and corrected.
- ◆ Water used for bathing does not need to be boiled.
- ◆ LET WATER COOL SUFFICIENTLY BEFORE DRINKING

The Department of Natural Resources will notify the public water system when the boil order *is rescinded*.

For more information, call **(PWS contact information)** or the Missouri Department of Natural Resources at **(RO phone number)**.

c: Public Drinking Water Branch

APPENDIX B

NOTICE OF BOIL WATER ORDER RESCINDED
(Acute Coliform MCL)

The Missouri Department of Natural Resources rescinded the boil water order for **(PWS name)** public water system ID# **(PWSid)**. The system is located off **(PWS location)**, in **(county)** County, **(in or near)**, Missouri. Department officials rescinded the boil order on **(date order lifted)**, after corrective action was taken to decontaminate the water system and test results from water samples collected on **(safe sample date(s))**, showed that water is again safe to drink.

Department officials issued the order on **(issue date)**, because Escherichia coliform bacteria and total coliform bacteria were found in some of the water samples taken from the water system on **(dates of E-coli positive samples)**. Escherichia coliform bacteria come from the intestines of warm blooded animals and are an indicator that the water has been contaminated by fecal material.

For more information, call **(PWS contact information)** or the Missouri Department of Natural Resources at **(RO phone number)**.

c: Public Drinking Water Branch

APPENDIX C

**BOIL WATER ORDER NEWS RELEASE
(TURBIDITY)**

The Missouri Department of Natural Resources has issued a boil water order to (pws) with public water system ID# (MO id). The system is located at (location) (near or in), Missouri. Department officials issued the order because of high turbidity levels.

Turbidity is the measurement of cloudiness of water, which can be caused by suspended solids in the water. There is no direct health effect for turbidity itself; however, it interferes with the public water system's ability to disinfect the water. Turbidity in finished water above the acute maximum contaminant level indicates that the treatment process has broken down and that disease causing parasites such as cryptosporidium or giardia may be present in the drinking water. The boil water order will remain in effect until corrective action has been taken and the department is convinced that the water is safe to drink.

Anyone served by the affected public water system should observe the following precautions:

- ◆ Water quality can be improved by allowing the suspended particles to settle and using the clear water to boil.
- ◆ Boil water vigorously for three minutes prior to use for cooking or drinking. Use only boiled water for drinking, diluting fruit juices, and all other food preparation.
- ◆ Disinfect food contact surfaces (dishes) by immersing them for at least one minute in clean tap water that contains one teaspoon of unscented household bleach per gallon of water.
- ◆ Dispose of ice cubes and remake with water that has been boiled.
- ◆ Continue to allow the suspended particles to settle and using the clear water to boil for all water that is to be used for cooking or drinking until the cause of the contamination has been found and corrected.
- ◆ Water used for bathing does not need to be boiled.

(PWS name) or the Missouri Department of Natural Resources will notify public water system when the boil order has been lifted.

For information, call (PWS contact information) or contact the Missouri Department of Natural Resources' (Kansas City, Northeast, Saint Louis, Southeast or Southwest) Regional Office at (RO phone number).

c: Public Drinking Water Branch

APPENDIX D

**NOTICE OF BOIL WATER ORDER RESCINDED
(Acute Turbidity)**

The Missouri Department of Natural Resources rescinded the boil water order for **(PWS name)** with public water system ID# **(PWSid)**. The system is located off **(PWS location)**, in **(county)** County, **(in or near)**, Missouri. Department officials rescinded the boil order on **(date order lifted)**, after corrective action was taken to decontaminate the water system and test results from water samples collected on **(safe sample date(s))**, showed that water is again safe to drink.

Department officials issued the order on **(issue date)**, because of high turbidity levels in the finished water. Turbidity in finished water above the acute maximum contaminant level indicates that the treatment process had broken down and that disease causing parasites such as cryptosporidium or giardia may have been present in the drinking water.

To assure that possible contamination is removed from customer plumbing all customers should flush all the water lines in their home, business or building by operating all water faucets (both hot and cold), water appliances and flushing toilets. Any customer that notices colored or odorous water should report this to the water system official listed below or to the department.

For more information, call **(PWS contact information)** or the Missouri Department of Natural Resources at **(RO phone number)**.

c: Public Drinking Water Branch

APPENDIX E

**BOIL WATER ORDER NEWS RELEASE
(LOW PRESSURE)**

The Missouri Department of Natural Resources (DNR) has issued a boil water order for **(pws)**, with Public Water System #**(PWSID)**. The system is located at **(pws location)** in **(county)** County, **(in or near)**, Missouri. Department officials issued the order because of a loss of pressure on **(date)** that affected (a large portion or all) of the public water system, **(describe what happened and the area of the system affected if not the entire system)**. When water pressure is low, conditions exist which could allow contamination to enter the distribution system or household plumbing. When large areas of a system are involved the probability that contamination has occurred is high. The boil water order took effect on **(date)**, and will remain in effect until water sample results indicate that no contamination is present.

Anyone served by the affected public water system should observe the following precautions:

- ◆ Boil water vigorously for three minutes prior to use for cooking or drinking.
- ◆ Disinfect food contact surfaces (dishes) by immersing them for at least one minute in clean tap water that contains one teaspoon of unscented household bleach per gallon of water.
- ◆ Dispose of ice cubes and remake with water that has been boiled.
- ◆ Continue boiling all water that is to be used for cooking or drinking until the cause of the contamination has been found and corrected.
- ◆ Water used for bathing does not need to be boiled.
- ◆ LET WATER COOL SUFFICIENTLY BEFORE DRINKING

For information, call **(PWS contact information)** or contact the Missouri Department of Natural Resources the at **(RO phone number)**.

c: Public Drinking Water Branch

APPENDIX F

**NOTICE OF BOIL WATER ORDER RESCINDED
(LOW PRESSURE)**

The Missouri Department of Natural Resources (DNR) has lifted the boil water order for **(PWS name)**, with Public Water System ID #**PWSID**). The system is located at **(PWS location)** in **(county)** County, **(in or near)**, Missouri. Department officials lifted the order on **(date order issued)**, after test results from water samples taken **(dates)**, showed that the water is safe to drink.

Department officials declared the order because of low water pressure reported on **(date issued)**. **(Reason why low pressure occurred at system and describe the area of the system affected if not the entire system)**.

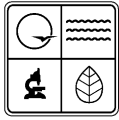
When water pressure is low, conditions exist which could allow contamination to enter the distribution system or household plumbing.

To assure that possible contamination is removed from customer plumbing all customers should flush all the water lines in their home, business or building by operating all water faucets (both hot and cold) and flushing toilets. Any customer that notices colored or odorous water should report this to the water system official listed below or to the department.

For information, call **(PWS contact information)** or contact the Missouri Department of Natural Resources at (RO phone number).

c: Public Drinking Water Branch

APPENDIX G



MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SERVICES DIVISION
REPORT OF LOW WATER PRESSURE

FOR OFFICE USE ONLY

PROJECT ID NUMBER

DATE RECEIVED

SYSTEM SPECIFICS

Missouri Public Drinking Water Regulation 10CSR60-7.010(2) requires that public water systems notify the department within 48 hours of a failure to comply with any regulation or monitoring requirement. Since the regulation 10CSR60-4.080(9) requires all public water systems to maintain a minimum pressure of 20 psi, all public water systems must notify the department when pressures in their system fall below 20 psi. **Use this form to report low pressure events directly to the Department Regional Office in your area.**

SYSTEM NAME	PWS ID#	COUNTY
-------------	---------	--------

REPORTED BY	DATE REPORTED (MM/DD/YYYY)
-------------	----------------------------

DESCRIBE NATURE OF PROBLEM

LOWEST PRESSURE READING (PSI)	DURATION OF LOW PRESSURE (HOURS/MINUTES)	DATE AND TIME OF PROBLEM ONSET	NUMBER OF SERVICES AFFECTED
-------------------------------	--	--------------------------------	-----------------------------

LOCATION AND AREA AFFECTED

CORRECTIVE ACTION TAKEN

DATE AND TIME OF CUSTOMER NOTIFICATION

METHOD OF CUSTOMER NOTIFICATION (IF NOTICE WAS DONE BY HAND DELIVERY ATTACH A COPY OF THE NOTICE TO THIS SHEET)

I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete and accurate.

SIGNATURE	DATE
-----------	------

MAIL OR FAX COMPLETED COPY TO APPROPRIATE REGIONAL OFFICE:

ST. LOUIS REGIONAL OFFICE – 7545 S. Lindbergh, Ste 210, St. Louis, MO 63125; Phone 314-416-2960; FAX 314-416-2970
KANSAS CITY REGIONAL OFFICE – 500 NE Colbern Road, Lee's Summit, MO 64086-4710; Phone 816-622-7000; FAX 816-622-7044
SOUTHWEST REGIONAL OFFICE – 2040 W. Woodland, Springfield, MO 65087-5912; Phone 417-891-4300; FAX 417-891-4399
SOUTHEAST REGIONAL OFFICE – 2155 N. Westwood Blvd., Poplar Bluff, MO 63901; Phone 573-840-9750; FAX 573-840-9754
NORTHEAST REGIONAL OFFICE – 1709 Prospect Drive, Macon, MO 63552-2602; Phone 660-385-8000; FAX 660-385-8090

APPENDIX H

EXAMPLE BOIL WATER ORDER for ACUTE COLIFORM MCL VIOLATION
(To be accompanied by a notice of violation and public notification information)

CERTIFIED MAIL

#####

File
County
PWS ID #

Date

Name
pws
Address

BOIL WATER ORDER

Dear

On **DATE**, the public water system (name of system) has violated the acute microbiological maximum contaminant level for fecal coliform bacteria set by the Public Drinking Water Regulation 10 CSR 60-4.020(7). Because some of the routine and repeat sample results which caused this violation were positive for *Escherichia coliform*, this violation may pose an **ACUTE RISK TO HEALTH** and the Missouri Department of Natural Resources (MDNR) under authority provided in RSMo 640.130 is issuing this **BOIL WATER ORDER** effective immediately.

System officials are hereby ordered to issue a public notice to all customers of the water system advising them to boil their drinking and culinary water before use. The notice must be issued within 24 hours of the date of this letter. The notice must be issued in a form and manner reasonably calculated to reach all persons served. The notice may be delivered using broadcast media such as radio and television or by hand delivery. The notice must stay into effect as long as the Boil Water Order is in effect.

The following actions must be taken. Items 1-4 must be completed before the boil water order can be lifted. The remaining items must be done but will not affect lifting the order.

1. Within seven calendar days of the date of this letter, the public water system shall disinfect and flush the entire water system. Recommended disinfection and flushing procedures are outlined in the enclosed forms for a *Report of Investigation and Corrective Action for Microbiological Maximum Contamination Level Violation*.
2. (Choose between the following two paragraphs depending upon whether or not the pws has full time chlorination)

Since the system does have full time chlorination, the system shall increase disinfectant dosages and flush the system until at least 0.5 mg/l of free available chlorine is present throughout the water distribution

system. After flushing the public water system shall collect three bacteriological samples at three different routine sampling sites. One of these samples shall be from a site with an *Escherichia* coliform positive result that caused the violation and the other samples shall be from routine sites throughout the distribution system. The samples must all test absent for total and *Escherichia* coliform bacteria or the disinfection/flushing procedures and sampling must be repeated.

Since the public water system does not have full time chlorination, the system must wait until all chlorine residual has dissipated or has been flushed from the system following the disinfection/flushing procedure, then the public water system shall collect three bacteriological samples each day for two consecutive business days at three different routine sampling sites. One of these samples shall be from a site with an *Escherichia* coliform positive result that caused the violation and the other samples shall be from routine sample sites geographically scattered throughout the distribution system. The consecutive day samples must all test absent for total and *Escherichia* coliform bacteria or the disinfection/flushing procedures and consecutive day sampling must be repeated.

3. Within 14 calendar days of the date of this letter the public water system shall investigate the cause of the acute MCL violation, take corrective actions, and submit a written report to the Missouri Department of Natural Resources, (address, city, MO zip), (phone #), detailing the investigation and corrective action taken. The written report requirement maybe fulfilled by completing and returning the enclosed form, a *Report of Investigation and Corrective Action for Microbiological Maximum Contamination Level Violation*.
4. Within ten calendar days of the date of this letter the public water system must make public notice in accordance with Safe Drinking Water Regulation 10CSR60-8.010 and return certification to this office or the address listed on the public notice forms. Forms and instructions are enclosed.
5. During the month following the acute MCL violation, the public water system shall submit at least five routine bacteriological samples as required by Safe Drinking Water Regulation 10CSR60-4.020(2)(E). Samples collected on consecutive days as outlined above will fulfill this requirement if these are collected in the month following the acute MCL violation.
6. If the public water system has two more microbiological MCL violation within (12) months, a Bilateral Compliance Agreement will be required or other enforcement measures will be taken.

Please contact this office concerning any problems or questions that arise.

Sincerely,

***** REGIONAL OFFICE

(staff)
Regional Director

XX/xx

Enclosures

c: Public Drinking Water Branch

APPENDIX I

EXAMPLE BOIL WATER ORDER FOR LOW PRESSURE

CERTIFIED MAIL

#####

File
County
PWS ID #

Date

Name
pws
Address

BOIL WATER ORDER

Dear

The public water supply serving (SYSTEM NAME) failed to maintain a minimum positive pressure of twenty pounds per square inch (20 psi) throughout the distribution system on DATE. Because inadequate pressure can result in contamination of the water with organisms that may pose an ACUTE RISK TO HEALTH, the Missouri Department of Natural Resources (MDNR) under authority provided in RSMo 640.130 is issuing this BOIL WATER ORDER effective immediately.

System officials are hereby ordered to issue a public notice to all affected customers of the water system advising them to boil their drinking and culinary water before use. The notice must be issued within 24 hours of the date of this letter in a form and manner reasonably calculated to reach all persons served. The notice may be delivered using broadcast media such as radio and television or by hand delivery. The notice must stay into effect as long as the boil water order is in effect.

The following actions must be completed before the boil water order can be lifted:

1. Within seven calendar days of the date of this letter, the public water supply must investigate the cause of the low pressure, correct the problem and submit a report to the department explaining the cause of the low pressures and the actions taken by system officials to correct the problem. You may use the enclosed form Report of Low Water Pressure and fax it to this Regional Office. If capital improvements are needed the public water supply shall submit two copies of an engineering report, prepared by a professional engineer who is registered in Missouri, to the MDNR, Public Drinking Water Branch, PO Box 176, Jefferson City, Missouri 65102, within 90 calendar days of the date of this letter.
2. When the low-pressure problem has been corrected and the pressure restored to a level above 20 psi throughout the distribution system, the public water supply shall disinfect and flush the affected area of the system. If the low pressure was caused by a water main break and repair the repaired main must be disinfected according to the enclosed American Water Works Association (AWWA) standards. For

systems that do not continuously disinfect the water we recommend chlorinating the entire system with mild chlorine levels suitable for human consumption according to the enclosed guidance.

3. When the disinfection/flushing procedure is completed, the public water supply shall collect three bacteriological samples each day on two consecutive business days. If any sample is found to be unsafe (total coliform positive) the disinfection/flushing procedure and consecutive samples shall be repeated until all samples are found to be safe (less than one coliform per 100 milliliters or total coliform absent).

Alternate for systems that disinfect

[Since the system continuously disinfects the water or purchases water that is disinfected flush the system until at least 0.5 mg/l of free available chlorine is present throughout the water distribution system. If chloramines are used as the disinfectant residual flush the system until at least 1.0 mg/l of total chlorine is present throughout the water distribution system. After flushing the public water system shall collect three bacteriological samples at three different routine sampling sites. One of these samples shall be from a site near where the low pressure event occurred and the other samples shall be from routine sample sites throughout the affected area of the distribution system. The samples must all test absent for total and *Escherichia* coliform bacteria or the disinfection/flushing procedures and sampling must be repeated.]

4. Within 21 calendar days of the date of this letter, the public water supply shall submit a written report to the MDNR, (address, city, Missouri zip), describing the investigation into the cause of the low pressure problem, corrective actions taken including date, disinfection/flushing procedures used including dates, pressure levels in problem areas after corrective actions and future corrective actions planned including dates.

The boil water order will not be lifted until the problem has been corrected (pressure restored above 20 psi) and analyses indicate the water is safe to drink.

Please contact this office concerning any problems or questions that arise.

Sincerely,

REGIONAL OFFICE

staff
Regional Director

XX/xx

Enclosures

c: Public Drinking Water Branch

APPENDIX J

EXAMPLE BOIL WATER ORDER FOR TURBIDITY
(To be accompanied by a notice of violation and public notification information)

CERTIFIED MAIL

#####

File
County
PWS ID #

Date

Name
pws
Address

BOIL WATER ORDER

Dear

On **DATE**, the public water system (name of system) has violated the acute microbiological maximum contaminant level for turbidity set by the Public Drinking Water Regulation 10 CSR 60-4.050(3). Turbidity in finished water above the acute maximum contaminant level indicates that the treatment process had broken down and that disease causing parasites such as cryptosporidium or giardia may be present in the drinking water. The Missouri Department of Natural Resources (MDNR) under authority provided in RSMo 640.130 is issuing this BOIL WATER ORDER effective immediately.

System officials are hereby ordered to issue a public notice to all customers of the water system advising them to boil their drinking and culinary water before use. The notice must be issued within 24 hours of the date of this letter. The notice must be issued in a form and manner reasonably calculated to reach all persons served. The notice may be delivered using broadcast media such as radio and television or by hand delivery. The notice must stay into effect as long as the boil water order is in effect.

The following actions must be completed before the boil water order can be lifted:

1. System operators must show to the satisfaction of the department that they have the treatment facilities under control and can consistently produce water that meets the 0.3 NTU maximum contaminant level and that will not exceed the acute maximum contaminant level again.
2. Flush the entire water distribution system and collect and test samples to assure that turbidities throughout the system are less than 0.3 mg/l. Samples must be collected at each hydrant and flushing device in the system, tested for chlorine residuals and turbidity and the results recorded.
3. If the system uses chloramines for disinfection, flush the system until a minimum of 1.0 mg/l chloramine residual is obtained throughout the distribution system. If the system uses free chlorine for disinfection, flush the system until a minimum of 0.5 mg/l free residual is obtained throughout the distribution system.

4. After flushing and testing collect at least five samples for total coliform bacteria analysis from routine bacteria sampling sites. If the samples test negative for coliform, the boil water order can be rescinded.
5. The same process described above must be followed for any secondary system served.
6. Within 21 calendar days of the date of this letter, the public water supply shall submit a written report to the MDNR, (address, city, state, zip), describing the investigation into the cause of the high turbidity, corrective actions taken including date, disinfection/flushing procedures used and future corrective actions planned including dates.

Please contact this office concerning any problems or questions that arise.

Sincerely,

REGIONAL OFFICE

Regional Director

XX/xx

Enclosures

c: Public Drinking Water Branch

APPENDIX K

**EXAMPLE BOIL WATER ORDER FOR
CONTAMINATED FINISHED WATER STORAGE**

CERTIFIED MAIL

#####

File
County
PWS ID #

Date

Name
pws
Address

BOIL WATER ORDER

Dear

On **DATE**, department representatives found evidence of contamination in the (describe and name the facility for example the Robert Hill Reservoir) that provides finished drinking water to (system name). During (a routine inspection, an unsafe sample investigation, an environmental concern investigation) department representatives found (describe evidence of contamination). Because contamination of this type can contaminate the water with organisms that may pose an **ACUTE RISK TO HEALTH**, the Missouri Department of Natural Resources (MDNR) under authority provided in RSMo 640.130 is issuing this **BOIL WATER ORDER** effective immediately.

System officials are hereby ordered to issue a public notice to all customers of the water system advising them to boil their drinking and culinary water before use. The notice must be issued within 24 hours of the date of this letter. The notice must be issued in a form and manner reasonably calculated to reach all persons served. The notice may be delivered using broadcast media such as radio and television or by hand delivery. The notice must stay into effect as long as the Boil Water Order is in effect.

The following actions must be completed before the boil water order can be lifted:

1. Within seven (7) calendar days of the date of this letter but sooner if possible, the public water supply must isolate the storage facility from the distribution system and drain the storage facility. This must be done in a manner that will allow continued adequate water service to be provided to all water customers of the system. Interrupting water service to customers served by the storage facility while draining and cleaning it is not acceptable.
2. Before the storage facility can be returned to service it must be cleaned and pressure washed to remove all sediment and contamination.

3. Before the storage facility can be returned to service it must be inspected by a qualified inspector to determine how the contamination got into the tank and a written report with photographs and recommendations for correcting the problem submitted to the system and the department.
4. If possible, make temporary repairs to the facility to allow it to be returned to service that are acceptable to the department.
5. Within sixty (60) days form the date of the storage inspection have permanent or long term repairs made to storage facility to prevent future contamination that are acceptable to the department.
6. If it is not possible to make temporary repairs to the facility keep the storage facility out of service until permanent or long term repairs can be made to prevent future contamination.
7. Once repairs are made but before the storage facility can be returned to service it must be disinfected by methods acceptable to the department. The preferred method is to spray the entire interior of the tank with a strong chlorine solution using a power washer. After disinfection the strongly chlorinated water in the storage facility must be diluted with system water until the chlorine residual is no less than 2.0 mg/l and no more than 4.0 mg/l free chlorine.
8. After chlorine residual in the storage facility in the tank is diluted the entire distribution system served by the facility must be flushed and tested to assure that at least 0.5 mg/l of free chlorine residual is provided throughout the distribution system.
9. Before the boil water order will be rescinded samples for bacteria analysis must be collected from the water in the tank and tested for coliform bacteria by a laboratory certified by the department. If the system does not practice continuous disinfection at least one sample per day must be collected on two consecutive days. If the system does practice continuous disinfection the water in the tank must contain at least 1.0 mg/l free available chlorine or 2.0 mg/l chloramines and one sample must be collected and tested for coliform bacteria. All samples must test negative for coliform bacteria or the disinfection and sampling process must be repeated until all samples test negative.

This boil water order will not be rescinded until the storage facility is removed from service, cleaned, repaired and disinfected by methods acceptable to the department. Please contact this office concerning any problems or questions that arise.

Sincerely,

REGIONAL OFFICE

Regional Director

XX/xx

Enclosures

c: Public Drinking Water Branch

APPENDIX L

**REPORT OF INVESTIGATION and CORRECTIVE ACTION FOR MICROBIOLOGICAL
MAXIMUM CONTAMINANT LEVEL VIOLATION**

Name of public water System _____
ID# of public water system _____ County _____
Month of MCL violation _____

REPORT OF INVESTIGATION AND CORRECTIVE ACTION***Required Chlorination***

I certify that the well(s), storage tank(s), and distribution system were disinfected and flushed on _____ (insert date) by the following methods: (List quantity of bleach or HTH added to each well and tank, what hydrants or taps were flushed and what chlorine residual was obtained.)

_____.

Section I - Sample Collection Techniques -List any problems

_____.

I certify that training was provided to each sample collector on _____ (insert dates) from the instructions found in the "Possible Sources of Contamination."

Section II - Wells List any problems

_____.

I certify that the following corrective actions were taken to correct existing well problems and that in the future the public water system will disinfect, flush, and test each well after repairs or new construction, will periodically inspect the well head openings and keep these sealed or screened and in good repair, and will keep the wells secure from vandalism. To the extent practical, well disinfection will be done in accordance with AWWA standards.

Corrective Actions Taken (include dates)

_____.

Section III - Tanks - List any problems

_____.

I certify that the following corrective actions were taken to correct existing tank problems and that in the future the public water system will disinfect, flush, and test each storage vessel after repairs or new construction and will periodically inspect all tank vents, overflows, hatches, and keep these screened, sealed, and in good repair.

Corrective Actions Taken (include dates)

Corrective Actions Taken (include dates)

Section IV - Disinfection Equipment - List any problems

I certify that the following corrective actions were taken to correct existing chlorinator problems and that in the future the public water system will periodically inspect all chlorinators and keep these in good repair, will monitor and record free chlorine residual daily at the wells, will monitor distribution total chlorine residual at the time of bacteriological sampling and record these residuals on the sample cards and the public water system water records, and will maintain a minimum free chlorine residual of 0.5 mg/L at the wells and a minimum total chlorine residual of 0.2 mg/L in the distribution system.

Corrective Actions Taken (include dates)

Section V – Distribution Problems - List any problems

I certify that in the future the public water system will disinfect, flush, and bacteriologically test the affected portion of the distribution system after each pressure loss, repair, or new construction and that all distribution leaks will be promptly repaired; to the extent practical, water main disinfection and flushing will be done in accordance with American Water Works Association (AWWA) standards.

Corrective Actions Taken (include dates)

Signature of Person Responsible for Report

Date

Typed or Printed Name

Title

Return to: Missouri Department of Natural Resources
Regional Office
(address)
(city), MO (zip code)

APPENDIX M

Chlorination Guidelines

Mild Chlorination Guidance - allows the water to be used while disinfecting entire water distribution system.

The amount of chlorine need for any particular well to achieve a 2 mg/L residual is determined only by experience. For small (6 inch diameter) wells it is best to add bleach in ½ gallon increments until no less than 2 mg/L and no more than 4 mg/l of free available chlorine residual is obtained. Bleach should be added down the casing vent hole. Do not put bleach in the pipe coming up from the pump. Rinse after the bleach addition with a garden hose since the chlorine will rust any metal with which is stays in contact.

For large systems without chlorinators that have unpressurized tanks, disinfection can be done by adding enough chlorine to the storage tank(s) to achieve 2 mg/L free chlorine residual, adding enough chlorine to the wells to obtain the recommended free chlorine residual then flushing hydrants on large mains beginning near the storage tanks and moving outward until at least a 0.5 mg/L free chlorine residual is obtained at each hydrant. In storage tanks, one gallon of unscented household bleach added to 25,000 gallons of water will theoretically result in 2 mg/L chlorine residual. One pound of 65% active calcium hypochlorite (HTH) added to 39,000 gallons of water will result in a 2 mg/L chlorine residual.

For large systems equipped with chlorinators that have unpressurized tanks, disinfection can be done by increasing the chlorinator feed rate to achieve a 2 mg/L free chlorine residual or adding additional bleach/HTH to the tanks to raise the chlorine level to 2 mg/L then flushing as indicated above.

For small systems without chlorinators that have pressurized tanks, disinfection can be done by adding bleach/HTH to the well(s) to achieve recommended free chlorine residual as described above then flushing the system. If fire hydrant/flushing valves are not available, residents should be asked to flush building plumbing until a chlorine odor is observed. On very small systems, the building plumbing taps can be flushed.

For small systems with chlorinators that have pressurized tanks, disinfection can be done by increasing the chlorine feed rate to achieve a 2 mg/L free chlorine residual then flushing the system as indicated above.

The American Water Works Association's standard for disinfecting wells and water mains is briefly outlined on the other side of this form. For repaired leaks and broken water mains water systems must use approved methods for repairing, disinfecting and flushing water mains. These procedures can be found in the Water Pollution Technical Bulletin - Repair and Disinfection of Water Mains.

The AWWA Standard for Disinfecting Water Mains C651-05 Section 4.7 includes the following:

- a. Isolate the section of main in which the break is located by closing valves and shutting off service connections. Use the distribution system map to choose appropriate valves for isolation and hydrants for flushing.
- b. After excavation, liberally apply hypochlorite (calcium hypochlorite tablets are best) to any water in the trench.
- c. Swab or spray the interior of all pipe and fittings to be used in the repair with a 1% hypochlorite solution.
- d. During the repair add sufficient hypochlorite inside the main to result in a 300 ppm chlorine solution. Slowly fill the main after repairs with water and allow the 300 ppm chlorine solution to have contact with the main for 15 minutes or more.
- e. Flush very thoroughly until all discolored water and strong chlorine are eliminated. If valves and hydrants permit, flush toward the work area from both directions.
- f. Reopen all valves and service connections.
- g. Collect SPECIAL bacteria samples in area affected after all chlorine is eliminated (for systems that do not chlorinate) or chlorine levels return to normal (for chlorinated systems).

The AWWA Standard for Disinfection of Wells C654-03 includes the following:

- a. Add sufficient hypochlorite to the well through the well vent so that the water in the drill hole contains 50 ppm. Allow 30 minutes for chlorine to react with the contamination. To calculate the amount needed, the diameter of the drill hole, the total well depth, and the static water level are needed.
- b. Surge the well (run for very short periods of time) 3 times to provide for some mixing.
- c. Allow the well to rest 12 to 24 hours.
- d. Install temporary piping from the well pump discharge to the casing vent and circulate a portion of the water back down the well while the remaining portion is discharged to waste. Continue until the chlorine residual measures zero then continue an additional 15 minutes.
- e. Collect two samples at least 30 minutes apart while the well is circulating and pumping water after the 15 minute period following no chlorine residual is completed. If both samples are found to be free of total coliform, return the well to service. If either sample contains total coliform, repeat disinfection procedure until 2 total coliform free samples are obtained.
- f. It is obvious the AWWA procedure applies to wells that can be left out of service for an extended period. For public water systems without an adequate number of wells to serve as backup, a much simpler, faster procedure must be used. This will involve chlorinating with a strong dose, pumping water until water is clear and contains 2 ppm to 4 ppm of free available chlorine, returning the well to service and collecting a SPECIAL sample when all traces of chlorine are gone in the raw water. If the SPECIAL sample is total coliform positive, repeat the procedure.

12/31/2008



**EL DIVIESO TODO
BEBER RIEG**



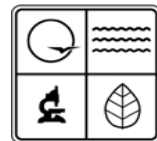
Hiervan el agua antes de usarla.

Su sistema público de agua está bajo una orden de agua de divieso. Usted necesita tomar las acciones siguientes:

1. Hiérvase agua vigorosamente durante tres minutos antes del uso. Utilice agua sólo hervida para beber, cepillando dientes, diluyendo jugos de frutas y todas las otras preparaciones de alimento, o el consumo. El uso de agua embotellada puede ser un posible, aunque relativamente costoso, la alternativa al agua hirviente corriente cuando bajo una orden de agua de divieso.
2. No utilice hielo de una casa icemaker automático ni utilice hielo hecho con unboiled agua de este sistema. Rehaga los cubitos de hielo con agua que se ha sido hervida o compra hielo.
3. Desinfecte platos y otras superficies de contacto de alimento por la inmersión para por lo menos un minuto en agua limpia corriente que contiene una cucharadita de unscented decolorante de casa por galón de agua.
4. PERMITA que AGUA REFRESQUE SUFFICIENTLY ANTES DE BEBER.

El agua utilizó para bañar no necesita se ser hervido generalmente. La supervisión de niños es necesaria al bañarse o las piscinas del traspatio que utilizan tan riegan no es ingerido. Las personas con cortes o sarpullidos severos pueden desear consultar sus médicos.

VEA el REVES PARA la INFORMACION ADICIONAL



E. COLI BOIL ORDER



El Departamento de Misuri de Recursos Naturales ha publicado una orden de agua de divieso para _____ identificación# MO _____ en ____ Condado.

La orden se publicó en _____ porque bacterias coliformes totales eran

Encontró en muestras de agua reunió en la fecha siguiente (las fechas) : _____ Y por lo menos uno de estas muestras probó también positivo para fecal coliforme o E.coli, las bacterias cuya presencia indica que el agua se puede contaminar con el humano o el animal malgasta. Los microbios en estos desechos pueden causar diarrea, los calambres, la náusea, los dolores de cabeza, u otros síntomas. Ellos pueden colocar un riesgo especial de la salud para niños, para niños jóvenes, y para las personas con sistemas inmunológicos severamente cedidos. Estas personas deben buscar el consejo acerca de agua potable de sus proveedores de asistencia médica. Las pautas generales en maneras de disminuir el riesgo de contagio por microbios está disponible de la Línea Directa Segura de agua potable de EPA en 1-800-426-4791.

La orden se quedará vigente hasta que las muestras de agua indiquen el contaminante es no presente más largo. Usted será notificado cuando la orden de agua de divieso se levanta. Usted puede alcanzar el personal de su sistema de agua llamando:

En _____
(persona de Contacto en sistema de agua) (Teléfono #)
UNA descripción de la causa del problema y acciones se tomando para corregirlo es:

Para la Información adicional, usted puede contactar la Oficina Regional del sudoeste del departamento la Oficina Regional en (RO phone #) o Público que Beben Rama de Agua en 573-751-5331.



**BOIL ALL
DRINKING
WATER**



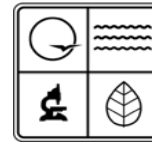
Hiervan el agua antes de usarla.

Your public water system is under a boil water order. You need to take the following actions:

1. Boil water vigorously for three minutes prior to use. Use only boiled water for drinking, brushing teeth, diluting fruit juices and all other food preparations or consumption. Use of bottled water may be a feasible, though relatively expensive, alternative to boiling tap water when under a boil water order.
2. Do not use ice from a household automatic icemaker or use any ice made with unboiled water from this system. Remake ice cubes with water that has been boiled or buy ice.
3. Disinfect dishes and other food contact surfaces by immersion for at least one minute in clean tap water that contains one teaspoon of unscented household bleach per gallon of water.
4. **LET WATER COOL SUFFICIENTLY BEFORE DRINKING.**

Water used for bathing does not generally need to be boiled. Supervision of children is necessary while bathing or using backyard pools so water is not ingested. Persons with cuts or severe rashes may wish to consult their physicians.

SEE REVERSE FOR ADDITIONAL INFORMATION



Boil Water Order E.coli



Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien.

Date Issued: _____ ID#: MO

Water System Name: _____ County: _____

For information from your water system contact:

_____ at _____
(Name) (Phone Number)

DNR Regional Office Phone #: _____

DNR Public Drinking Water Program Phone #: (573) 751-5331
Corrective actions taken: _____

Department officials issued the order because total coliform bacteria was found in water samples collected on the following date(s): _____

At least one of these samples also tested positive for fecal coliforms or *E. coli* bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These symptoms are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice.

People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers.

FOLD



BOIL ALL DRINKING WATER



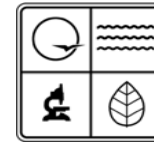
Hiervan el agua antes de usarla.

Your public water system is under a boil water order. You may need to take the following precautions:

1. Boil water vigorously for three minutes prior to use. Use only boiled water for drinking, brushing teeth, diluting fruit juices and all other food preparations or consumption. Use of bottled water may be a feasible, though relatively expensive, alternative to boiling tap water when under a boil water order.
2. Do not use ice from a household automatic icemaker or use any ice made with unboiled water from this system. Remake ice cubes with water that has been boiled or buy ice.
3. Disinfect dishes and other food contact surfaces by immersion for at least one minute in tap water that contains one teaspoon of unscented household bleach per gallon of water.
4. **LET WATER COOL SUFFICIENTLY BEFORE DRINKING.**

Water used for hand-washing or bathing does not generally need to be boiled. Supervision of children is necessary while bathing or using backyard pools so water is not ingested. Persons with cuts or severe rashes may wish to consult their physicians.

SEE REVERSE FOR ADDITIONAL INFORMATION



Boil Water Order Low Pressure



Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien.

Date Issued: _____ ID#: MO

Water System Name: _____ County: _____

For information from your water system contact:

_____ at _____
(Name) (Phone Number)
DNR Southwest Regional Office Phone #: _____

DNR Public Drinking Water Branch Phone #: 573- 751-5331
Your public water system is under a boil water order due to low water pressure. Low or complete loss of, water pressure could allow contamination to enter the public water system by backflow or back-siphonage. The order will remain in effect until sample results indicate that no bacterial contamination is present.
Description of problem:

Corrective actions taken: _____

People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

FOLD



**BOIL ALL
DRINKING
WATER**



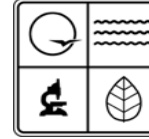
Hiervan el agua antes de usarla.

Your public water system is under a boil water order. You need to take the following actions:

1. Boil water vigorously for three minutes prior to use. Use only boiled water for drinking, brushing teeth, diluting fruit juices and all other food preparations or consumption. Use of bottled water may be a feasible, though relatively expensive, alternative to boiling tap water when under a boil water order.
2. Do not use ice from a household automatic icemaker or use any ice made with unboiled water from this system. Remake ice cubes with water that has been boiled or buy ice.
3. Disinfect dishes and other food contact surfaces by immersion for at least one minute in clean tap water that contains one teaspoon of unscented household bleach per gallon of water.
4. **LET WATER COOL SUFFICIENTLY BEFORE DRINKING.**

Water used for hand-washing or bathing does not generally need to be boiled. Supervision of children is necessary while bathing or using backyard pools so water is not ingested. Persons with cuts or severe rashes may wish to consult their physicians.

SEE REVERSE FOR ADDITIONAL INFORMATION



**Este informe contiene
información muy importante
sobre su agua potable.
Tradúzcalo o hable con alguien
que lo entienda bien.**



Date Issued: _____ ID#: MO

Water System Name: _____ County: _____

For information from your water system contact:

_____ at _____
(Name) (Phone Number)

DNR Regional Office Phone #: _____

DNR Public Drinking Water Program Phone #: (573) 751-5331

Turbidity Level: _____ turbidity units, Date: _____

Corrective actions taken: _____

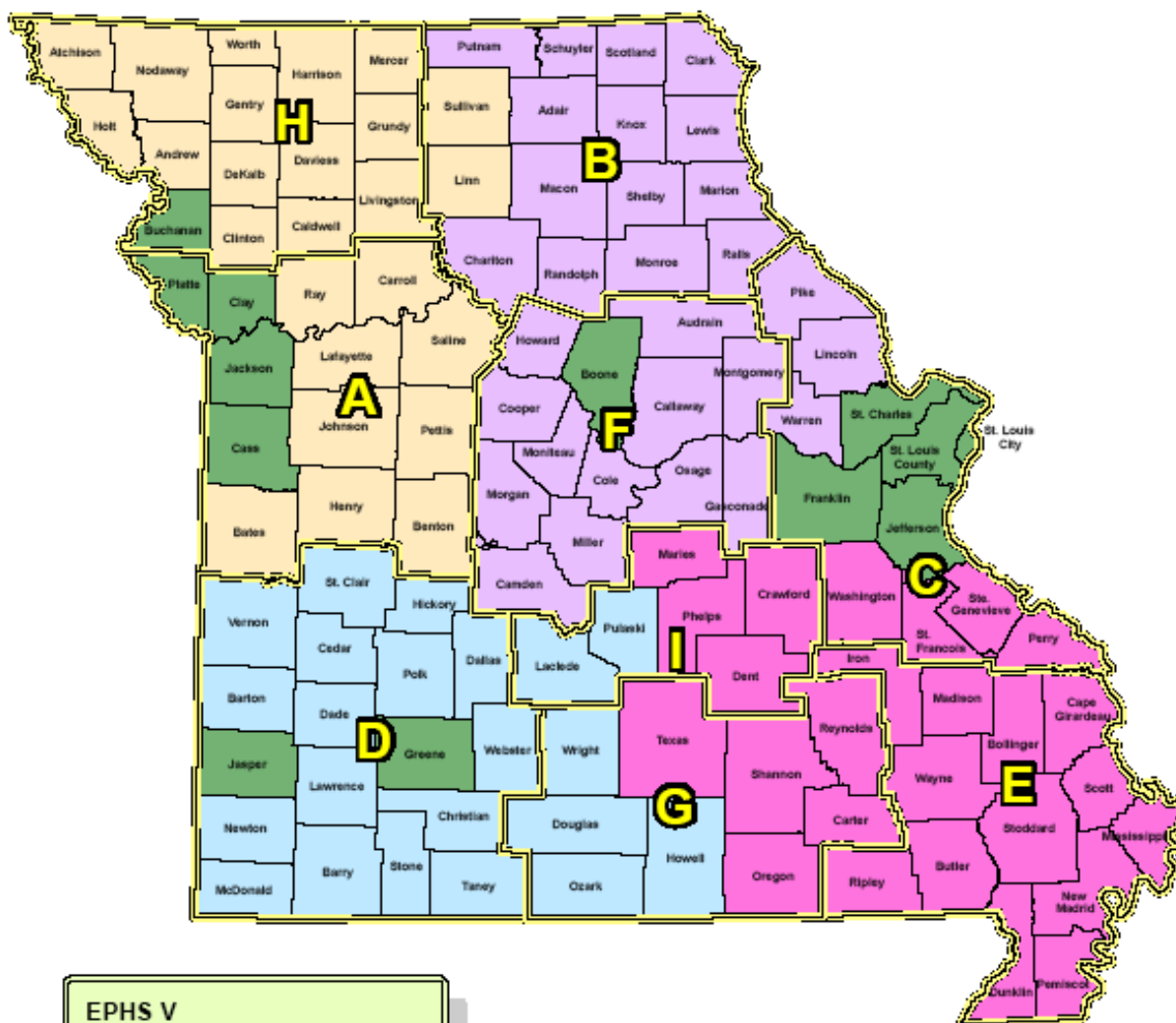
FOLD

The Missouri Department of Natural Resources (DNR) has issued a boil water order due to the high turbidity level given above. Turbidity is the measurement of cloudiness of water, which can be caused by suspended solids in the water. There is no direct health effect for turbidity itself; however, it interferes with the public water system's ability to disinfect the water. Turbidity in finished water above the acute maximum contaminant level indicates that the treatment process has broken down and that disease causing parasites such as cryptosporidium or giardia may be present in the drinking water. These organisms can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. These symptoms are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice.

People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, businesses).

Department of Health and Senior Services Bureau of Environmental Regulation and Licensure EPHS V Technical Assignments



EPHS V	
	Mary Fandrey
	Rachelle Kuster
	Ellen Dettman
	Ann Elledge
	Steve Krysiak
	Highway Patrol Troop Boundary

EPHS V	OFFICE	CELL
Mary Fandrey	(573) 751-9090	(573) 880-4989
Rachelle Kuster	(573) 751-8095	(573) 880-7447
Ellen Dettman	(816) 350-5405	(816) 810-9031
Ann Elledge	(573) 290-5884	(573) 714-1501
Steve Krysiak	(417) 895-8915	